



**USAID**  
FROM THE AMERICAN PEOPLE

**LEBANON**

# LITANI RIVER BASIN MANAGEMENT SUPPORT PROGRAM

FARMER SATISFACTION SURVEY

NOVEMBER-DECEMBER 2010

MARCH 2011

This report was produced for review by the United States Agency for International Development (USAID). It was prepared by International Resources Group (IRG) under Contract EPP-I-00-04-00024-00 order no 7.



# LITANI RIVER BASIN MANAGEMENT SUPPORT PROGRAM

FARMER SATISFACTION SURVEY  
NOVEMBER-DECEMBER 2010

Contract No.: EPP-I-00-04-00024-00 order no 7.

MARCH 2011

## DISCLAIMER

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government



# TABLE OF CONTENTS

## LIST OF ACRONYMS

## FOREWORD

## EXECUTIVE SUMMARY

<b>I.</b>	<b>INTRODUCTION .....</b>	<b>I</b>
1.1.	Authorization.....	I
1.2.	Program Objectives .....	I
1.3.	Program Components.....	I
1.4.	Purpose of the Report.....	2
1.5.	Content of the Report.....	3
<b>2.</b>	<b>SURVEY AREA AND PRINCIPLES .....</b>	<b>4</b>
2.1.	Survey Area.....	4
2.2.	Survey Approach .....	5
2.3.	Sampling and Representativeness .....	5
2.4.	Survey Implementation and Issues.....	6
2.5.	Data Analysis .....	6
<b>3.</b>	<b>QUALITATIVE PRE-SURVEY .....</b>	<b>7</b>
<b>4.</b>	<b>SURVEY RESULTS .....</b>	<b>9</b>
4.1.	Farmer Perception of Water Issues.....	9
4.1.1.	Relevant questionnaire questions .....	9
4.1.2.	Main findings .....	9
4.1.3.	Conclusion .....	9
4.2.	Farmer Willingness to solve Water Issues.....	10
4.2.1.	Relevant questionnaire questions .....	10
4.2.2.	Main findings .....	10
4.2.3.	Conclusion .....	10
4.3.	Relationship with and Awareness of Roles of LRA and other GOL agencies .....	10
4.3.1.	Relevant questionnaire questions .....	10
4.3.2.	Main findings .....	11
4.3.3.	Conclusion .....	11
4.4.	Farmer Choice of Irrigation Water Source .....	12
4.4.1.	Relevant questionnaire questions .....	12
4.4.2.	Main findings .....	12
4.4.3.	Conclusion .....	12
4.5.	Farmer Satisfaction with LRA Services.....	12
4.5.1.	Relevant questionnaire questions .....	12
4.5.2.	Main findings .....	13
4.5.3.	Conclusion .....	13
<b>5.</b>	<b>APPENDICES .....</b>	<b>14</b>
5.1.	Appendix A: Field Pictures .....	14
5.2.	Appendix B: List of LRA Subscribers .....	19
5.3.	Appendix C: Questionnaire .....	23
5.4.	Appendix D: Detailed Results .....	29



# LIST OF ACRONYMS

GOL	Government of Lebanon
IR	Intermediate Result (from USAID Result Framework)
IQC	Indefinite Quantity Contract (a contracting mechanism for USAID)
IRBM	Integrated River Basin Management
IWRM	Integrated Water Resources Management
IRG	International Resources Group (a Washington DC-based consulting firm that is prime contractor for USAID Lebanon)
LOE	Level Of Effort
LRA	Litani River Authority (a Lebanese governmental agency, also called ONL, Office National du Litani)
LRBMS	Litani River Basin Management Support Program
M&E	Monitoring & Evaluation
NGO	Non-Governmental Organization
O&M	Operation & Maintenance
PMP	Performance Monitoring Plan (for LRBMS)
USAID PMP	Performance Management Plan (for USAID Lebanon)
RFTOP	Request for Task Order Proposal
STTA	Short-Term Technical Assistance
TA	Technical Assistance
USAID	United States Agency for International Development
WUA	Water User Association





# FOREWORD

This farmers' satisfaction survey was carried out by a Statistics Lebanon Ltd. team led by Dr. Rania Boustani, an agricultural engineer and statistics professor at the Lebanese University (LU), under subcontract with International Resources Group (IRG), the main contractor under the Litani River Basin Management Support (LRBMS) Program, a USAID-funded program in Lebanon (Contract EPP-I-00-04-00024-00 Task Order No. 7) under the Integrated Water and Coastal Resources Management Indefinite Quantity Contract (IQC) II.

Analysis of results and reporting were conducted by Statistics Lebanon Ltd. under the management and supervision of the General Manager, Mr. Rabih el Haber.



# EXECUTIVE SUMMARY

## BACKGROUND

As part of the implementation of the LRBMS Program, IRG is to monitor progress and achievements through a Performance Monitoring Plan (PMP). The LRBMS PMP uses thirteen indicators, some of them being drawn from the USAID Lebanon Performance Management Plan. One of these indicators (from the USAID PMP) is a customer satisfaction survey. This indicator was defined under LRBMS as focusing on the only water users that are directly served by the counterpart agency, the Litani River Authority (LRA), i.e. farmers who annually subscribe to receive irrigation water from the LRA-managed “Canal 900”. A survey was thus carried out to assess the level of satisfaction of these farmers but also to investigate farming practices and constraints and thus guide LRBMS activities.

## SURVEY PROCESS

Before conducting the statistical survey, field investigations familiarized the survey team with the characteristics of the area and farmers. Farmer interviews provided insights on farmers’ issues and perception of Canal 900 management by LRA. The findings were:

1. Management inefficiency: Farmers are negatively affected by the poor management of the Canal 900 distribution network.
2. Mistrust in the LRA-farmer relationship: Communications are limited and biased.
3. Short irrigation season: Canal 900 operates only in May-October, while rains sometimes do not occur in April and November (and crops are also grown in winter).
4. Pollution issue: Poor water quality impacts crop quality and equipment.

The survey team then identified five research topics:

1. Identify and prioritize public perception of water-related problems affecting them.
2. Assess interest/willingness to be engaged in solving water-related issues.
3. Assess relationship with LRA and other governmental agencies.
4. Identify farmer decision making regarding irrigation water source (groundwater or surface).
5. Assess farmer satisfaction with irrigation services provided by LRA.

A simple and focused questionnaire was then developed to address these five research themes. The size of the survey sample was set at 50, as a compromise between the:

- Need to have a representative sample, which requires a minimum size of 20-30 farmers; and

- Total number of farmers in the area (200 to 300, out of which 100 or so are subscribed).

42 farmers were randomly selected from the LRA subscription list, while respecting the geographic spread and holding size. A small number (8) of non-subscribed farmers (irrigating from private wells) were also involved as control group. The respondents' age ranged between 20 and 70 years. 92% of the respondents were male and only 8% of them were female. The final sample can be considered as reasonably representative, since sampling errors cannot be completely eliminated.

Survey was conducted in December 2010 by enumerators familiar with the survey area.

## **MAIN SURVEY FINDINGS**

**Farmer Perception of Water Issues:** Pollution is by far the most prevalent water issue, mentioned by more than half of the respondents. The wide majority of farmers consider water issues to be either LRA's responsibility or at best a joint farmer-LRA task. This suggests considerable scope for awareness raising regarding inadequate farming practices.

**Farmer Willingness to solve Water Issues:** Lack of interest in collective action is clear, with a huge majority of respondents convinced that farmers will not compromise with each other. But on the other hand farmers seem to be somewhat ready to pay for better water services.

**Relationship with and Awareness of Roles of LRA and other GOL agencies:** Communication between LRA and farmers is deficient: most farmers claim that they only meet with LRA when subscribing at the beginning of the season. None of the agricultural cooperatives, extension services and other organizations seem to be of much assistance to them. All respondents would expect Ministry of Agriculture extension services to assist them, while they see LRA exclusively as the water manager.

**Farmer Choice of Irrigation Water Source:** Sprinkler and drip are by far the largest type of irrigation, with few still using furrow irrigation ("flooding"). The choice of equipment is mainly guided by the suitability for the types of irrigated crops (sprinklers for potatoes, drip for vegetables and orchards, etc.).

Canal water is definitely a better economic solution for farmers (pumping costs are somewhat double of the LRA fees), but timing, quality of delivery, and pollution are constraints that favor groundwater withdrawal over canal water.

**Farmer Satisfaction with LRA Services:** While customer satisfaction for canal water is decent (46%), specific questions show that there is room for improvement in quality, quantity and timing of the water delivery. This should not necessarily be read as poor LRA performance since most of these issues are due to farming practices (pollution) or energy shortages and inadequate network design (quantity and timing issues).

# ملخص تنفيذي

## الخلفية

قامت شركة IRG بمراقبة تقدم وتطور النتائج من خلال خطة مراقبة الاداء (PMP) المعتمدة وذلك كجزء من البرنامج التنفيذي لـ LRBMS. إن خطة مراقبة الاداء المنفذة من قبل الـ LRBMS اعتمدت على ثلاثة عشر مؤشر، بعض من هذه المؤشرات تعتمد على خطة ادارة الاداء في الـ USAID لبنان، واحد من هذه المؤشرات هو استقصاء مدى رضى الشركاء في العمل. اعتمد برنامج الـ LRBMS هذا المؤشر الذي يركز على مستخدمي المياه ومدى رضاهم عن تقديمات المصلحة الوطنية لنهر الليطاني من خلال مشروع ري البقاع الجنوبي المعروف بمشروع القناة ٩٠٠. تم القيام بهذا المسح بالطبع لمعرفة مستوى تقبل المزارعين للتقديمات او لعمل المصلحة الوطنية لنهر الليطاني من جهة ومن جهة اخرى للتحقيق في التطبيقات الزراعية للمزارعين انفسهم ما يساعد في تحديد او توجيه نشاط الـ LRBMS.

## عملية المسح

قبل اجراء المسح الاحصائي، قام الفريق المختص بالتعرف إلى المنطقة وعلى المزارعين. قدمت المقابلات مع المزارعين رؤيتهم الواضحة لادارة مشروع ري القناة ٩٠٠ وكانت النتائج على الشكل التالي:

- ١ عدم الكفاءة الادارية: ابدى المزارعين امتعاضهم من الطريقة التي تدار فيها شبكة الري
  - ٢ عدم الثقة ما بين المصلحة الوطنية لنهر الليطاني والمزارعين: تقتصر الاتصالات على بعض الاشخاص وهي محدودة جداً
  - ٣ الفترة الزمنية القصيرة للري: تعمل القناة ٩٠٠ من ايار إلى تشرين الاول، حيث تتوقف الامطار احياناً من شهر نيسان إلى تشرين الثاني ما يؤدي خلل في عملية الري
  - ٤ قضية التلوث: نوعية المياه السيئة تؤثر على نوعية المحاصيل وعلى المعدات المستخدمة
- قام فريق المسح بتحديد خمس مواضيع بحثية على الشكل التالي:

- ١ وضع اولويات وتحديد مشاكل المياه التي تؤثر على المزارعين
- ٢ تقييم الفائدة/ الرغبة في المشاركة في حل المسائل المتعلقة بالمياه
- ٣ تقييم العلاقة بين المصلحة الوطنية لنهر الليطاني و الجهات الحكومية الاخرى

٤ تحديد المزارعين ذوي القدرة على اخذ القرار لجهة مصدر المياه (مياه جوفية أو سطحية)

٥ تقييم رضا المزارعين عن خدمات الري التي تقدمها المصلحة الوطنية لنهر الليطاني

ومن ثم تم تطوير استبيان بسيط ومركز لمعالجة المواضيع البحثية الخمسة اعلاه حيث تم تعيين حجم عينة المسح بـ ٥٠ مزارع، كحل وسط بين:

- الحاجة إلى وجود عينة معبرة ويمكن الاعتماد عليها، الامر الذي يتطلب ٢٠ إلى ٣٠ مزارع عن كل ١٠٠ مزارع و
- حيث ان اجمالي المزارعين في المنطقة يتراوح بين ٢٠٠ إلى ٣٠٠ والمشاركين في ري الليطاني ١٠٠، لذلك تم اختيار ٤٢ مزارعاً من المشتركين بطريقة عشوائية و٨ مزارعين من غير المشاركين والذين يعتمدون على الآبار الجوفية الخاصة اما بالنسبة إلى اعمار المشتركين في المسح فتراوحت بين ٢٠ و ٧٠ عاماً، ٩٢% منهم من الذكور و٨% من الاناث. وبهذه الطريقة يمكن اعتبار هذا المسح يعكس بشكل كبير الواقع.

وقد اجري هذا المسح في كانون الاول ٢٠١٠ من قبل اشخاص على دراية في منطقة المسح.

### النتائج الرئيسية للمسح

تصور المزارعين لمشاكل المياه: ذكر اكثر من نصف المستطلعين ان التلوث هو المشكلة الاله والاسع انتشاراً. معظم المشاركين في المسح يعتبرون ان التلوث هو مسؤولية مصلحة الليطاني او اقله مسؤولية مشتركة مع المزارعين. إن هذا الامر يؤشر إلى زيادة في الوعي بشأن الممارسات الزراعية غير الكافية.

ارادة المزارعين في حل قضايا المياه: لقد كان واضحاً عدم الاهتمام بالعمل الجماعي لدى المزارعين كذلك ابدى المستطلعين عدم الرغبة في التنازل لبعضهم البعض، هذا من جهة ومن الجهة الاخرى ابدى المستطلعين استعدادهم للدفع اكثر في حالة تقديم خدمات ري افضل.

هناك نقص في العلاقة ما بين مصلحة الليطاني والجهات الحكومية الاخرى ما ينعكس سلباً على دور المصلحة التوعوي حيث ان معظم المزارعين يلتقون مع عمال المصلحة فقط مع بداية موسم الري اي لدى ذهابهم للتسجيل في مكاتب المصلحة، حيث قالوا انهم لا يلتقون اي مساعدة من قبل جهات الارشاد الزراعي. وقد عبر جميع المستطلعين عن رغبتهم في تلقي الارشاد الزراعي من قبل وزارة الزراعة وان ينحصر دور المصلحة الوطنية لنهر الليطاني في ادارة المياه.

بالنسبة إلى اختيار المزارعين لمصدر مياه الري (جوفي أو من القناة ٩٠٠): فإن ما يحدده هو طريقة الري حيث ان معظم المزارعين يستخدمون الري بالتنقيط للخضار والاشجار المثمرة او بالرشاشات للبطاطا وكلاهما يحتاج إلى الضغط وبالتالي يفضل استخدام شبكة الليطاني مع العلم ان عدد قليل من المزارعين لا يزال يعتمد على الطرق التقليدية اي الري بالتطويق.

من الناحية الاقتصادية فإن جميع المزارعين يفضلون استخدام مياه القناة (كلفة الضخ من الآبار الجوفية هي ضعف التعرفة المعتمدة من قبل الليطاني)، ولكن، عامل الوقت ونوعية التوصيل والتلوث كلها امور تجعل الاعتماد على المياه الجوفية اكثر رواجاً.

رضا المزارعين عن الخدمات التي تقدمها المصلحة الوطنية لنهر الليطاني: لقد عبر ٤٦% من المستطلعين عن رضاهم عن خدمات المصلحة وعن اعتقادهم بان هناك امكانية كبيرة لتحسين توقيت التزويد بالمياه ونوعية التسليم ما يؤثر إلى فهمهم او تفهمهم للمشاكل التي تعاني منها المصلحة لجهة التلوث مثلاً أو انقطاع التيار الكهربائي بشكل شبه دائم وهذا تقييم جيد وليس فقيراً على الاطلاق لاداء المصلحة.





# I. INTRODUCTION

## I.1. AUTHORIZATION

International Resources Group (IRG) was contracted by USAID/Lebanon (Contract EPP-I-00-04-00024-00 Task Order No. 7) under the Integrated Water and Coastal Resources Management Indefinite Quantity Contract (IQC) II to implement the Litani River Basin Management Support (LRBMS) Program. The period for performance of the contract is September 29, 2009 to September 30, 2012.

## I.2. PROGRAM OBJECTIVES

The purpose of the LRBMS Program is to set the ground for improved, more efficient and sustainable basin management at the Litani river basin through provision of technical support to the Litani River Authority and implementation of limited small scale infrastructure activities.

The LRBMS program is part of USAID's increasing support for the water sector in Lebanon. The Litani River Basin suffers the fate of many river basins around the world: increasing demands compete for limited natural resources. Groundwater over-exploitation, deforestation and overgrazing, unplanned urban sprawl, untreated wastewater effluents, and unsustainable agricultural practices contribute to environmental degradation in the form of declining water and soil quality.

Solutions do exist to reverse these trends and establish sustainable management practices. The key to successfully implement such solutions requires applying the principles of Integrated Water Resources Management (IWRM) through a single river basin authority rather than multiple agencies responsible for different aspects of water management as is the case in many countries. Fortunately, the existence of the Litani River Authority (LRA) provides a unique platform to become such an IWRM river basin authority that will mobilize stakeholders in the river basin and address these challenges in an integrated manner. Successful implementation of LRBMS will prepare the LRA to assume the role of an integrated river basin authority upon the removal of the present legal constraints.

## I.3. PROGRAM COMPONENTS

Under the LRBMS program, LRBMS will work with national and regional institutions and stakeholders to set the ground for improved, more efficient and sustainable basin management at the Litani River basin. The LRBMS technical assistance team will provide technical services and related resources to LRA in order to improve their planning and operational performance and equip them with the necessary resources for improved river basin management.

Under the LRBMS program, LRBMS will work with national and regional institutions and stakeholders to set the ground for improved, more efficient and sustainable basin management at the Litani River basin. The LRBMS technical assistance team will provide technical services and related resources to LRA in order to improve their planning and operational performance and equip them with the necessary resources for improved river basin management.

To achieve the LRBMS program objectives, the Contractor shall undertake tasks grouped under the following four components:

- 1) Building Capacity of LRA towards Integrated River Basin Management
- 2) Long Term Water Monitoring of the Litani River
- 3) Integrated Irrigation Management which will be implemented under two sub-components:
  - a. Participatory Agriculture Extension Program: implemented under a Pilot Area: West Bekaa Irrigation Management Project
  - b. Machghara Plain Irrigation Plan
- 4) Risk Management which will be implemented under two sub-components:
  - a. Qaraoun Dam Monitoring System
  - b. Litani River Flood Management Model

## **I.4. PURPOSE OF THE REPORT**

As part of the implementation of the LRBMS Program, IRG is to monitor progress and achievements through a Performance Monitoring Plan (PMP). The LRBMS PMP uses thirteen indicators, some of them being drawn from the USAID Lebanon Performance Management Plan. One of these indicators is a customer satisfaction survey to be carried out under LRBMS.

This indicator was defined under LRBMS as focusing on the only water users that are directly served by LRA, the counterpart agency, that is the farmers located next to “Canal 900” and who annually subscribe to receive irrigation water (among other responsibilities, LRA manages an irrigation system based around “Canal 900”, a canal supplied with water pumped from Qaraoun reservoir and which serves about 600 ha around the town of Joub Jenine). In order to assess the level of satisfaction of these farmers, a survey was thus conducted to investigate farming practices and notably farmers’ interactions and satisfaction with the services provided by LRA

This report presents the survey results as conducted by a team from Statistics Lebanon (a company specialized in opinion studies and research analysis) led by Dr. Rania Boustani (Lebanese University professor and expert in agriculture).

## **I.5. CONTENT OF THE REPORT**

The remainder of this report is divided into three chapters:

- Chapter 2 defines the survey scope and objectives, as well as the methodology used, its principles and limitations;
- Chapter 3 presents the findings of the initial qualitative study; and
- Chapter 4 presents the results of the conducted survey and the analysis of the five investigated topics.

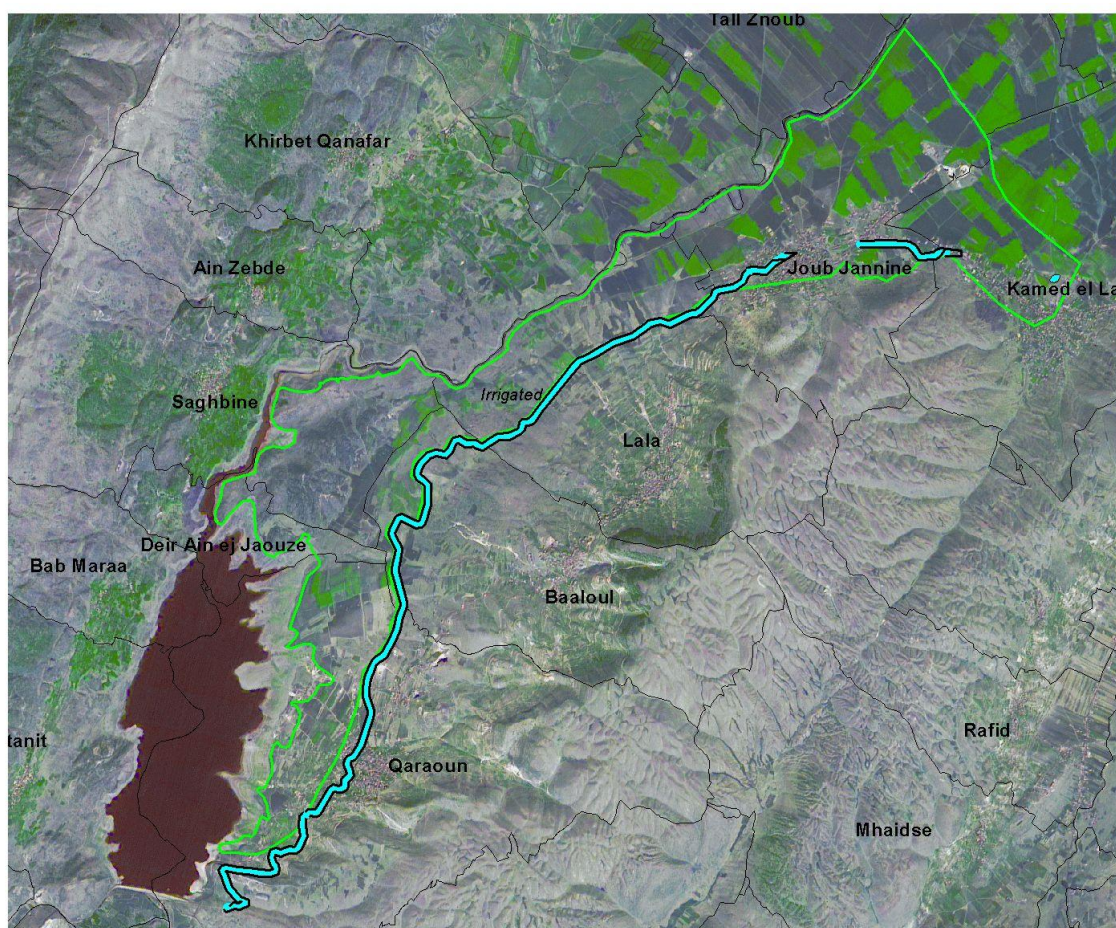
# 2. SURVEY AREA AND PRINCIPLES

## 2.1. SURVEY AREA

The survey focused on farmers in the Canal 900 command of the LRA in the central Bekaa Valley. The objective was to conduct a client satisfaction and opinion survey in order to measure farmers' practices, choices, preferences, issues, and constraints.

The number of farm households in this area is estimated at 200 to 300. This area is located north-east of the Qaraoun lake and includes farmland in the villages of Qaraoun, Baaloul, Lala, Joub Jenine, Saghbine, and Kamed Loz.

Survey Area



## 2.2. SURVEY APPROACH

The survey was led in two steps. Before conducting the statistical survey, field investigations (qualitative survey) familiarized the survey team with the characteristics of the area and farmers (see chapter 3).

Based on field findings, the survey team identified five research topics as well as critical issues for the quantitative assessment. The five research objectives of the survey were defined as follows:

1. Identify and prioritize public perception of water-related problems affecting them.
2. Assess interest/willingness to be engaged in solving water-related issues.
3. Assess relationship with and awareness of roles of LRA and other governmental agencies.
4. Identify factors entering into farmer decision making regarding the irrigation water source they choose (ground or surface).
5. Assess farmer satisfaction with the irrigation service being provided by the Litani River Authority.

A questionnaire was then developed to address these five research themes (see Appendix C). The questionnaire was voluntarily kept simple and focused, but with enough questions (23) for each research theme to be addressed through several questions:

Theme \ Question#	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
General information	X	X	X	X	X																		
1. Farmer perception of water issues.							X			X				X			X						
2. Farmer interest/willingness to be engaged in solving water issues.										X						X	X	X					
3. Relationship with and awareness of roles of LRA and other gov. entities.												X			X				X	X	X	X	X
4. Factors guiding farmer decision making regarding irrigation water source.					X	X					X												
5. Farmer satisfaction with irrigation service provided by LRA.								X	X				X										

## 2.3. SAMPLING AND REPRESENTATIVENESS

The size of the survey sample was set at 50, as a compromise between the:

- Need to have a representative sample, which requires a minimum size of 20-30 farmers; and
- Total number of farmers in the area (200 to 300, out of which 100 or so are subscribed).



The list of subscribed farmers (97 farmers in 2010) was provided by LRA. Out of this list, 42 farmers were randomly selected while respecting the geographic spread (to have sampled farmers in all locations) and holding size (to have sampled farmers with small and large holdings).

A small number (8) of non-subscribed farmers (irrigating from private wells) were also involved as control group. The difficulty was here to identify such farmers as no official census exists. Lists of farmers were obtained from municipalities and the Ministry of Agriculture for the relevant villages.

The larger part of the sample inhabits Lala, Qaraoun and Joub Jannine (22% from each respectively), with 14% from Soghbine, 12% from Baaloul and 8% of respondents from Kamed-el-Loz. These 50 farmers operate 115 holdings, whether owned or rented (65 % rented, 34% owned and 1% is half owned and half rented). The respondents' age ranged between 20 and 70 years. 92% of the respondents were male and only 8% of them were female. The final sample can be considered as reasonably representative, since sampling errors cannot be completely eliminated.

## **2.4. SURVEY IMPLEMENTATION AND ISSUES**

Survey was conducted in December 2010 by five enumerators familiar with the survey area. These enumerators were first trained on administering the questionnaire and then supervised in the field by a coordinator.

The enumerators faced a couple of issues:

- Natural reluctance of Bekaa residents to answer questions, especially if they perceive them to come from the government;
- Some hesitancy in expressing negative views of LRA for fear of repercussions; and
- Some difficulties in tracking down farmers. They go to the farmers' houses and no one's there, then they go to the field and they can't find the people in charge

The first two issues were addressed by ensuring confidentiality of responses names and that the results will be presented in percentages without reference to names helped, though partially, in overcoming this fear. In Joub Jenine, a "moukhtar" (local municipality clerk) was involved to build trust with respondents.

## **2.5. DATA ANALYSIS**

Data collected was entered and checked under SPSS. All errors detected were corrected by referring back to the original questionnaires or by an additional field trip. Frequency distributions and cross-tabulations were then prepared.

### 3. QUALITATIVE PRE-SURVEY

Survey team first had meetings with LRA resident Mechanical Engineer (Jamal Ayoub) and resident Agricultural Engineer (Youssef Antoun). These meetings were aimed at collecting general information about the project and forming a primary perception of the situation. Moreover, visits to the canal itself with its reservoirs and pumps were made coupled with a walk on the canal in K1, K2 and GG.

Meetings with various farmers (both subscribed and unsubscribed with LRA) were held at their holdings and not at their homes. The topics discussed at the visits with the farmers were diverse but focused on problems with farming and water issues.

The interviews conducted also helped to identify how is generally perceived Canal 900 management by LRA. The following findings seem to be quite widespread among the interviewed farmers:

1. Management inefficiency: Farmers are negatively affected by the poor management of the Canal 900 distribution network. Water they are paying for is not delivered as allocated and needed (both in terms of timing and quantity). Farmers complain about frequent and unpredictable interruptions in the water delivery (they obviously do not understand that this is often linked to energy cuts and out of LRA's control).
2. Mistrust and unbalance in the LRA-farmer relationship: Farmers express concerns that “political” favoritism applies in the selection of subscribed farmers (not all who apply get subscribed) and also in the way individual issues are addressed. They also resent an unfair relationship where LRA is the authority which ignores and/or subdues them. Some farmers mentioned that they were asked to sign a disclaimer (form by which the LRA would not be held responsible for any damages that occurred to crops). They resent it since poor water delivery impacts their yields while there were also instances when water outlets ruptured due to pressure and the resulting water flow ruined crops.
3. Short irrigation season: Farmers expressed dissatisfaction with the fact that they were only given water in the summer cycle (May-October), when there was no rainfall. There is water delivery (Canal 900 is shut down) during Winter while sometimes rainfall is not sufficient for irrigation (there was limited rainfall last winter 2009-10 in the Bekaa and Lebanon in general). Farmers also complained about the late start of the Canal 900 delivery in the Spring (usually end of April, while the last rains may occur in March), and the early closure (usually early October, while first rains may not come before end of November).

4. Pollution issue: Poor water quality heavily impacts farming in terms of crop quality and equipment deterioration. They complain that the filtering system provided by LRA is insufficient as it does not remove the algae (thus clogging pipes, sprinklers, and drip nozzles). Interestingly enough, farmers mention factory effluents and wastewater networks, but not nitrate pollution from over-fertilization.



# 4. SURVEY RESULTS

The main results are presented here per research theme. Detailed results are provided in Appendix D.

## 4.1. FARMER PERCEPTION OF WATER ISSUES

### 4.1.1. RELEVANT QUESTIONNAIRE QUESTIONS

Question #	Purpose
7	To list main water issues faced by farmers
10	To identify who is (and who should be) addressing water issues
14	To assess farmers' assessment of network
17	To evaluate farmers' preferences for water delivery management

### 4.1.2. MAIN FINDINGS

Pollution is by far the most prevalent water issue, mentioned by more than half (56%) of the respondents, while water scarcity come second. A majority of farmers (60%) state that LRA (as representing the GOL) is responsible for solving water issues, while less than 40% consider LRA-farmer collaboration as a solution.

Interestingly enough (since many complain about delivery insufficiencies), a large majority of respondents (85%) consider the Canal 900 delivery network (the infrastructure) as being effective and strong.

Finally farmers are equally distributed (54%-42%) between those who consider mastering irrigation scheduling and those who admit that technical assistance could be useful.

### 4.1.3. CONCLUSION

The fact that the wide majority of farmers consider water issues to be either LRA's responsibility or at best a joint farmer-LRA task suggest considerable scope for further awareness regarding inadequate farming practices. Farmers for example seem to ignore (or choose to ignore) that algae problems (which are the main pollution issues) are partially due to over-fertilization. Since Canal 900 is a canal that flows "upstream", it is relevant to mention to farmers that the water they use (surface or groundwater) is heavily loaded with nitrates that they are too liberally spreading on their fields.

## 4.2. FARMER WILLINGNESS TO SOLVE WATER ISSUES

### 4.2.1. RELEVANT QUESTIONNAIRE QUESTIONS

Question #	Purpose
10	To identify who is (and who should be) addressing water issues
16	To assess farmers' willingness to pay for extra water delivery
17	To evaluate farmers' preferences for water delivery management
18	To assess farmer collaboration with each others.

### 4.2.2. MAIN FINDINGS

As stated earlier, a majority of farmers (60%) state that LRA (as representing the GOL) is responsible for solving water issues, while less than 40% consider LRA-farmer collaboration as a solution. But the lack of collective action extends also to farmer-farmer collaboration, with a huge majority (85%) convinced that farmers will not compromise with each other. This is sad news indeed, with individualism being the acknowledged favorite behavior.

Water scarcity being a recognized issue, it is also interesting to note that 62% of respondents would be willing to pay extra to receive water outside of the Canal 900 operating period (May-October).

### 4.2.3. CONCLUSION

Involving farmers in solving water issues seems to be an uphill battle, with farmers not willing to collaborate with each other. But interestingly enough farmers seem to be somewhat ready to pay for better water services.

## 4.3. RELATIONSHIP WITH AND AWARENESS OF ROLES OF LRA AND OTHER GOL AGENCIES

### 4.3.1. RELEVANT QUESTIONNAIRE QUESTIONS

Question #	Purpose
12	To evaluate the type of farmer-LRA interactions
15	To assess farmers' views of LRA non-water responsibilities
19	To evaluate the frequency of farmer-LRA interactions

21	To assess farmers' views of LRA's handling of pollution
22	To inventory farmers' knowledge and views of the roles of various entities including (LRA)
23	To identify farmers' needs in terms of technical assistance.

### **4.3.2. MAIN FINDINGS**

Communications from LRA towards farmers are poor according to farmers, with 60% or more claiming that they never or rarely receive advice or information from LRA. Similarly, 62% of farmers claim that they only meet when subscribing (and paying the fee) at the beginning of the season. On the specific pollution issue, 30% consider that LRA is not addressing it, 60% that LRA could do more, and only 10% that LRA is actively solving the issue.

None of the agricultural cooperatives, extension services and other organizations seem to be of much assistance to farmers with 70 to 80% or them stating that all of these are extremely inactive. However 96% of respondents would expect extension services to assist them, but coming from Ministry of Agriculture and related agencies, not from LRA, which they perceive exclusively as the water manager (over 90% say so, even for water distribution at plot level, and over 75% consider it as LRA's role, not farmers' role).

Respondents also confirm that even if they sometimes meet with other farmers (but 40% say never or rarely), 60% or more are clearly unwilling to compromise or sacrifice for the common good.

### **4.3.3. CONCLUSION**

Communications between LRA and farmers are clearly deficient, with other governmental agencies being even less present. But there are definitely expectations, with farmers in demand of extension services. It is interesting to observe how years of centralized management has turned farmers (whose elders used to collaborate on sharing water springs at village level) into individualistic behaviors with both a lack of accountability (farmers don't see themselves as responsible for water issues or supposed to solve them) and a contradicting need for assistance (GOL should do it!).

## 4.4. FARMER CHOICE OF IRRIGATION WATER SOURCE

### 4.4.1. RELEVANT QUESTIONNAIRE QUESTIONS

Question #	Purpose
5	To inventory type of irrigation equipment used, and reasons for the choice
6	To compare pros and cons of different water sources
11	To assess farmers' opinion about Canal 900 fees

### 4.4.2. MAIN FINDINGS

Sprinkler (65%) and drip (50%) are by far the largest type of irrigation, with less than 10% still using furrow irrigation (“flooding”). The choice of equipment is mainly guided by the suitability for the types of irrigated crops (sprinklers for potatoes, drip for vegetables and orchards, etc.).

Canal water is recognized as being cheaper (62%) and for some (16%) more available, but also more polluted (36%) and not reliable in timing (30%) and quantity (10%). Groundwater withdrawal is acknowledged as being more readily available in quantity (46%) and timing (22%) as well as cleaner (10%) but pumping cost is a clear issue (for over 65% of respondents).

Canal 900 fee seem overpriced by 60% of respondents (35% find it fair priced).

### 4.4.3. CONCLUSION

Canal water is definitely a better economic solution for farmers (pumping costs are estimated as being at double of the LRA fees), but timing, quality of delivery, and pollution are constraints that favor groundwater withdrawal over canal water.

## 4.5. FARMER SATISFACTION WITH LRA SERVICES

### 4.5.1. RELEVANT QUESTIONNAIRE QUESTIONS

Question #	Purpose
8	To investigate the farmer's assessment of the services provided by LRA
9	To check if the farmer is satisfied with the LRA costs
13	To see if the farmer is satisfied with the LRA maintenance service

#### 4.5.2. MAIN FINDINGS

Answers by LRA subscribers were collected through question 8 of the questionnaire:

	Extremely satisfied	Somewhat Satisfied	Neutral	Somewhat Dissatisfied	Extremely Dissatisfied	No answer
Quality of Irrigation Water	2%	14%	38%	17%	29%	2%
Quantity of Irrigation Water	21%	12%	14%	19%	33%	21%
Timing of Irrigation Water	14%	19%	7%	19%	40%	14%
Overall services	17%	29%	33%	5%	17%	17%

Farmers are in general unsatisfied with the water services they receive from LRA, with about 40% being somewhat or very dissatisfied with the quality or quantity of water, and 60% somewhat or very dissatisfied with the timing of water delivery.

But overall, 46% of respondents are very or somewhat satisfied (only 22% being somewhat or very dissatisfied) with the services they receive from LRA. This can be understood from the convenience that Canal 900 water still constitutes: it is cheaper than groundwater pumping, it also saves the hassle of having to operate a pump and possibly have to access a neighbor's well.

#### 4.5.3. CONCLUSION

While customer satisfaction for canal water is decent (almost 50%), specific questions show that there is room for improvement in quality, quantity and timing of the delivery. This should not necessarily be read as poor LRA performance since:

- Quality issues are due chiefly to algal bloom in the canal which in turn is a direct consequence of over-fertilization by farmers in the Bekaa Valley; and
- Quantity and timing issues are mostly due to energy cuts that stop supply to the irrigation network, as well as to design and construction mistakes which limit the capacity of the network and cause repair and maintenance activities to impact the entire network.

But because of poor communications (see 4.3.3) and relationships between LRA and farmers, LRA gets the blame in all cases.

# 5. APPENDICES

## 5.1 APPENDIX A: FIELD PICTURES



**Figures 1: Private well pumps in Jeb Jannine, Kamed el Loz and Qaraoun**





**Figures 2: Canal 900**



**Figures 3: Irrigation in action**







## 5.1.



## 5.2 APPENDIX B: LIST OF LRA SUBSCRIBERS

Qaraoun		
#	Name	Area per dn
1	Sami Mansour Al forzali	23
2	Youssef Jbarah	2
3	Mohamad Al Ozanki	24
4	Mahmoud Al Ozanki	44
5	Fayrouz Mohamad Al Hamweh	1
6	Adel Dabajah	6
6	Adel Dabajah	2
7	Samir Hassan Saleh	200
7	Samir Hassan Saleh	30
8	Fayyed Mohamd Dabajah	6
9	Safa Issa	80
10	Khalil Mohamad El Jabal	45
11	Mohamad Homayed AL Askari	20
12	Hmaed Yassine	6
13	Faheem Chdeed	30
13	Faheem Chdeed	10
14	Hussein Zaghloul	3
15	Yoorob Haymour	1.5
16	Mohamad Jomaa Awwad	10
17	Ekram Nasser	2
17	Ekram Nasser	1
19	Khaled Thiab Karrameddine	10
19	Khaled Thiab Karrameddine	5
20	Hassib Khorfan	8
21	Mohamad Khorfan	3
	<b>TOTAL</b>	<b>572.5</b>

Saghbine		
#	Name	Area per dn
1	Hafeez El Ton	4
2	Ghassan Chdeed	4
3	Boutros Farhat	5
4	Hassan Youssef Hamoud	23
5	Hassib Shafik Mes'ed	5
5	Hassib Shafik Mes'ed	6
6	Haasan Samir Saleh	240
6	Haasan Samir Saleh	200
7	Hassan Moheyyedine Al Askar	21
8	Fares Shafik Zaydan	6
9	Fathallah Ftouh	2
10	Tannous Salim AL Khoury	15

11	Elias Sahwan	10
12	Youssef Abdallah	8
	<b>TOTAL</b>	<b>549</b>

<b>Lala</b>		
<b>#</b>	<b>Name</b>	<b>Area per dn</b>
1	Ahmad Ezzedine	3
2	Khaled Jomaa	40
2	Khaled Jomaa	4
3	Abdo Mohamad Zolfo	1
4	Ahmad Imad Al Karout	2.5
5	Nassif Michel El Bash	220
5	Nassif Michel El Bash	150
6	Antoine Shakib Saber	52
6	Antoine Shakib Saber	30
7	Hassan Ezzedine Ezzedine	25
8	Ghassan Shakib Saber	150
9	Youssef Said Omairy	20
9	Youssef Said Omairy	1
10	Mohamad Ali Al Louny	16
11	Hussein Jamil Torbeen	25
12	Mohamas Said Omairy	40
13	Khalil Said Omairy	65
14	Bahaa Said Rahal	3
15	Adnan Ali Saleme	1
16	Rawad Mohamad Chranek	40
17	Hussein Jomaa Hussein	30
18	Joseph Elias Nakhle	100
19	Ahmad Ali Jomaa	81
19	Ahmad Ali Jomaa	79
20	Najib Ali Jomaa	1
21	Abdel Latif Darwish	3
22	Ahmad Salim Rahal	1
23	Ibrahim Mohamad Jomaa	1
24	Mohamad Awwad	4
25	Mohamd Ezzedine	2
26	Khaled Najem El Deen	1
	<b>TOTAL</b>	<b>1191.5</b>

<b>Baaloul</b>		
<b>#</b>	<b>Name</b>	<b>Area per dn</b>
1	Abdallah Al Askar	55
1	Abdallah Al Askar	60
2	Talla'a Al Askar	63
3	Walid Toufik Al Safadi	2.5
4	Mohamad Mohyeedine Al Askar	31

4	Mohamad Mohyeedine Al Askar	8
5	Nawaf Jomaa Hussein	35
6	Fouad Mohamad AL Safadi	5
7	Melhem Al Khodor	6
	<b>TOTAL</b>	<b>265.5</b>

<b>Joub Janine</b>		
<b>#</b>	<b>Name</b>	<b>Area per dn</b>
1	Tarek Mohamad Taha	120
2	Mohamad Theeb Chranek	80
3	Issa Haymour	55
4	Ayman El Ahmar	42
5	Abdel Azeem Bsharah	80
6	Mansour Gerge Estfan	100
7	Ghantous Al Haddad	100
8	Najib Mohamad Chranek	80
9	Samih Hassan Nasser	120
10	Mahmoud Al to'aymi	135
11	Samir Hassan Saleh	150
12	Abdallah Rifai Haymour	150
13	Nizar Abdel Ghani Mayta	125
14	Raafat Ahmad Chranek	100
15	Amine Saleh Merhej	100
16	Emtisal Ismail Al zaghir	10
17	Jamal Mohamad Romeih	2
18	Mohamad Abdo Hasheesh	150
19	Issa Ahmad Al Fayyad	130
20	Badih Al Hajj	100
21	Abdel Raouf Hussein Al Adawi	100
22	Ahmad Chranek	8
23	Abdel Ghani Dsouki	30
24	Abbas Hussein Abbas	160
25	George Nakhle	10
26	Maen Charanek	1
27	Saleh Mosleh El Kor	1
	<b>TOTAL</b>	<b>2239</b>

<b>Kamed el Laouz</b>		
<b>#</b>	<b>Name</b>	<b>Area per dn</b>
1	Hussein Ibrahim El Kurdi	55
2	Ahmad Ibrahim El Kurdi	100
3	Monir Ibrahim El Kurdi	80
4	Ibrahim Hussein El Kurdi	140
5	Adel Ibrahim El Kurdi	75
6	Mohamad Ahmad Al Ghazawi	100

7	Youssef Ali Saffiyeh	100
8	Mohamad Sami Satty	140
9	Said Abou Hamia	150
10	Moamar Said Abou Hamia	150
11	Khaled Mohamad El Kurdi	40
12	Youssef Abdel Latif Fares	80
12	Youssef Abdel Latif Fares	30
13	Hussein Fares	100
	<b>TOTAL</b>	<b>1340</b>

<b>Kherbet Kanafer</b>		
#	<b>Name</b>	<b>Area per dn</b>
1	Habib Khalil Abboud	25

<b>Area per dn</b>	<b>6157.5</b>
<b>Number of farmer</b>	<b>Total Area Ha</b>
<b>107</b>	<b>615</b>



## 5.3 APPENDIX C: QUESTIONNAIRE

1. Do you have more than one holding?
  - a. Yes
  - b. No
2. Where do you get water for irrigation from?
  - a. LRA
  - b. Private Wells
  - c. Other (please specify)
3. Please tell me where your holding(s) is(are) located, whether you own it or have rented it from its owner, what size is it, the number of hours for irrigation, and the quantity of water used:

For LRA Subscribers

Holding Number	Owned / Rented	Location	Type of Soil (sand, silt, clay)	Size	Hours of Irrigation / day	Water Pressure	Frequency of Irrigation

For Owners of Wells and Subscribers to Wells

Holding Number	Owned / Rented	Location	Type of Soil (sand, silt, clay)	Size	Hours of Irrigation / day	Water Pressure	Frequency of Irrigation

4. Please tell me what crops you plant in each season.

Holding Number	Winter Crop	Summer Crop	Fall Crop

5. What type of irrigation do you use?

- a. Sprinklers
- b. Drip
- c. Cannon
- d. Flooding

5.1. What information guides you in choosing your irrigation type?

- a. Cheaper
- b. Availability
- c. Usage (suitability for crops)

6. Please tell me what are the strong points and the weak points for the following water sources:

	LRA	Own Wells	Private Wells of Others
Strong Points			
Weak Points			

7. Please name the top two water-related problems you are facing today.



8. *(For LRA Subscribers)* On a scale of 1-5 where 5 is Extremely satisfied, 4 is Somewhat Satisfied, 3 is Neutral, 2 is Somewhat Dissatisfied, 1 is Extremely Dissatisfied, how do you feel about the following:

	5	4	3	2	1
Quality of LRA Irrigation Water					
Quantity of LRA Irrigation Water					
Timing of LRA Irrigation Water					
Overall LRA services					

9. *(For Private well owners/subscribers)* On a scale of 1-5 where 5 is Extremely satisfied, 4 is Somewhat Satisfied, 3 is Neutral, 2 is Somewhat Dissatisfied, 1 is Extremely Dissatisfied, how do you feel about the following with regards to Private well owning and subscription:

	5	4	3	2	1
Quality of Irrigation water					
Quantity of Irrigation Water					
Timing of Water					
Overall services					

**10. Which of the following statements do you agree with the most?**

- Water-related problems should be treated by the LRA
- Water-related problems can be treated through better cooperation between the farmers and LRA
- Water-related problems are the responsibility of the farmers
- There are no water-related problems

**11. How would you describe the fees you pay LRA?**

- Over priced
- Fair
- Under priced

**12. How often do you:**

	Always (Daily)	Often (Once a week)	Sometimes (Once a month)	Rarely (Once a year)	Never
Receive Advice from LRA					
Receive explanations for sudden water shortage					
Get informed about maintenance works					
Hold meetings with farmers to discuss issues					
Compromise and make sacrifices for the sake of the general community					

**13. Which of the following statements best describes your point of view?**

- a. The maintenance carried out by the LRA is inadequate and untimely.
- b. The maintenance carried out by the LRA is properly scheduled and helpful

**14. Which of the following statements best describes your point of view?**

- a. The water network is strong and stable
- b. The water network is frail and cannot withstand pressure
- c. The water network could be stronger and more effective

**15. Name two non water-related problems that in your opinion the LRA should handle.**

**16. (For LRA subscribers) If the LRA was willing to give irrigation water out of the regular times when rainfall is scarce, would you be willing to pay an extra amount of money for it?**

- a. Yes
- b. No

**17. With respect to the set-up of the way water is distributed over the holding, which of the following statements do you agree with the most?**

- a. I have enough experience to decide how the water should be distributed over my holding
- b. I wouldn't mind receiving professional advice from LRA on how to set up the water distribution system on my holding

**18. Which of the following statements do you agree with the most?**

- a. Farmer collaboration is effective and guarantees the rights of the farmers.
- b. Farmers will not compromise for the sake of one another

**19. When do you usually meet with LRA officials?**

- a. I meet with them at the LRA to pay my annual dues
- b. I meet with them at my holding when there is a problem
- c. I meet with them whenever I feel there is a need
- d. I don't meet with them at all

20. Please tell me how active are each of the following:

	Extremely Active	Somewhat Active	Somewhat Inactive	Extremely Inactive
Farmer Coop				
Government Agricultural Regional Centers				
Local / International Organizations				

21. With respect to the problem of water pollution, which of the following statements do you agree with the most?

- The LRA is actively involved in limiting and controlling this problem
- The LRA should be more active in controlling and solving the problem
- The LRA is not dealing with the problem of pollution whatsoever
- There is no pollution problem

22. For each activity in the following list, please tell who is currently performing it and who you think should be handling it:

Activity		LRA	Ministry of Agriculture & Extensions	Farmers	Ag. Assistants at shops	Farmer Associations
Extension Services (Advice on seeds, fertilizers, pesticides, cropping patterns)	Who handles this now?					
	Who should handle it?					
Water distribution at system level (canal 900 and Pump stations)	Who handles this now?					
	Who should handle it?					
Water distribution at plot level (rotation among farmers)	Who handles this now?					
	Who should handle it?					

**23. On a scale of 1-5 where 5 is Extremely Necessary, 4 is Somewhat Necessary, 3 is In between, 2 is Somewhat unnecessary, 1 is Extremely unnecessary, please rate the need for the following:**

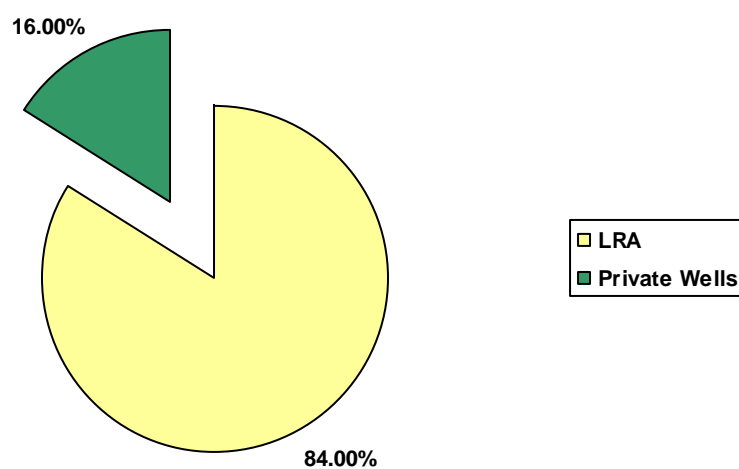
	Extremely Necessary	Somewhat Necessary	In Between	Somewhat Unnecessar y	Extremely Unnecessar y
Regular Testing of seeds in Professional Labs					
Regular testing of the water in Professional Labs					
Regular testing of the soil in Professional Labs					
Testing produce for quality and residues					
Setting up a model parcel under LRA control where specialized experts would work and show farmers effective irrigation practices, fertilizer application, and various agricultural practices.					

## 5.4 APPENDIX D: DETAILED RESULTS

### 1- Do you have more than one holding?

		Location					
		Qaraoun	Baaloul	Joub Jannine	Soghbine	Kamed-el-Loz	Lala
More than one holding	Yes	45.50%	54.50%	66.70%	90.90%	85.70%	25.00%
	No	54.50%	45.50%	33.30%	9.10%	14.30%	75.00%

### 2- Where do you get water for irrigation?



**N.B:** 0% of the respondents said that they get water from other resources than LRA and private wells.

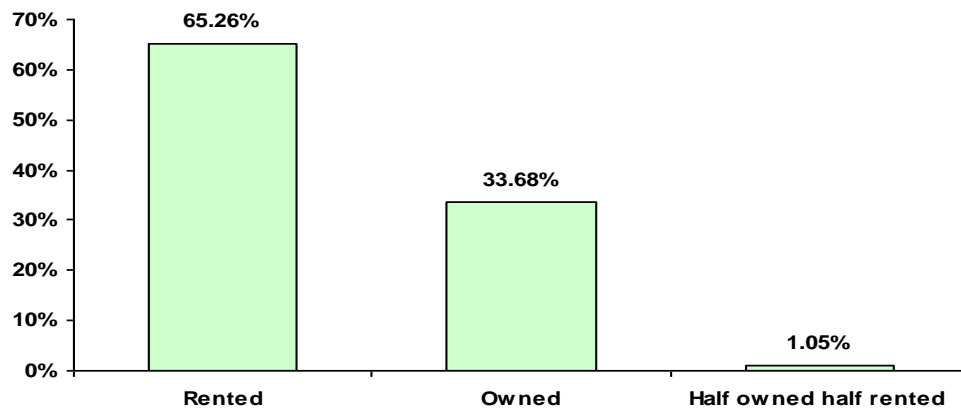
### 3- Information about holdings

#### ✓ Results For LRA Subscribers

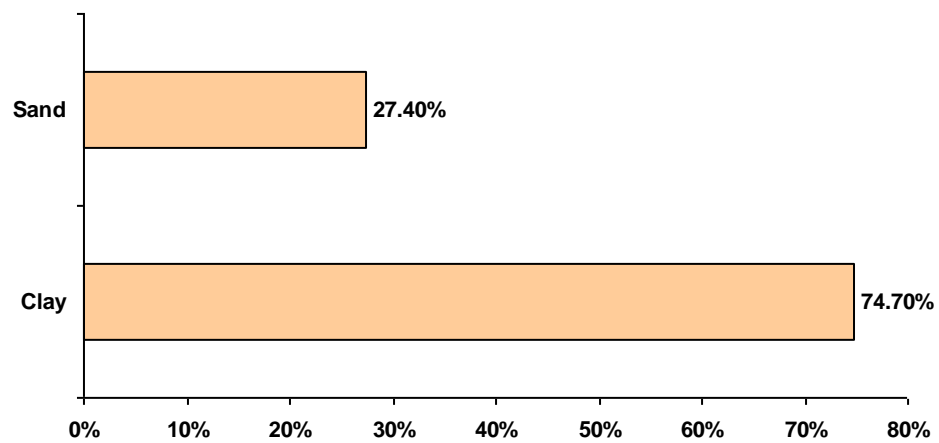
#### • Information about the holdings

Number of holdings = 95

- **Owned or Rented**



- **Type of soil**



- **Area (× 1000 square meter)**

Mean	60.45
Mode	50.00
Std. Deviation	83.76
Minimum	0.50
Maximum	450.00

- **Hours of irrigation per day**

	Percent
2	2.11%
4	2.11%
5	12.63%
6	12.63%
7	4.21%
8	10.53%
10	5.26%
12	18.95%
15	2.11%
24	6.32%
4-9	3.16%
4-12	6.32%
6-12	1.05%
6-14	7.37%
24 hours each 5 days	1.05%
Non-irrigated	1.05%
Non-irrigated wheat	1.05%
Once each 15 days	1.05%
Wheat	1.05%
Total	100.00%

**PIPE GAUGE**

Water in mm

- **LRA subscribers**

	Percent
24.88	1.05%
25.4	1.05%
38.09	1.05%

50.8	18.95%
63.5	21.05%
76.19	7.37%
88.89	3.16%
101.6	22.11%
127	7.37%
152.39	12.63%
304.79	1.05%
No answer	3.16%
Total	100.00%

- Private wells

	Percent
101.6	4.76%
152.39	90.48%
203.2	4.76%
Total	100.00%

- Frequency of irrigation (per week)

	Percent
1	44.21%
2	8.42%
3	14.74%
4	5.26%
6	9.47%
7	5.26%
Once each 15 days	4.21%
No answer	2.11%
Once each 16 days	2.11%
Once each 5 days	1.05%
Twice per month	1.05%
2 weeks per year	1.05%



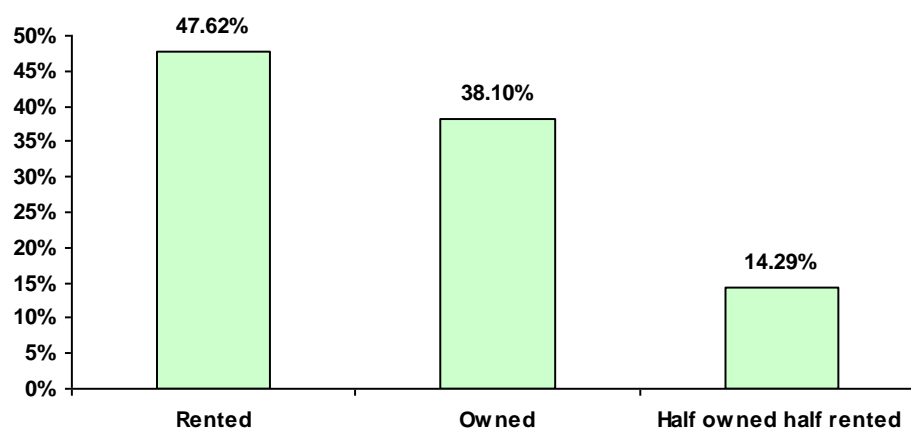
Each 15 days 5 days	1.05%
Total	100.00%

✓ **Results For owners of wells and subscribers to wells**

• **Information about the holdings**

Number of holdings = 21

- **Owned or Rented**



- **Type of soil** : All the holdings are Clay

- **Area (× 1000 square meter)**

Mean	38.64
Mode	5.00
Std. Deviation	48.73
Minimum	1.00
Maximum	170.00

- **Hours of irrigation per day**

Mean	14.29
Mode	24.00
Std. Deviation	9.02

<b>Minimum</b>	<b>4.00</b>
<b>Maximum</b>	<b>24.00</b>

- **Frequency of irrigation (per week)**

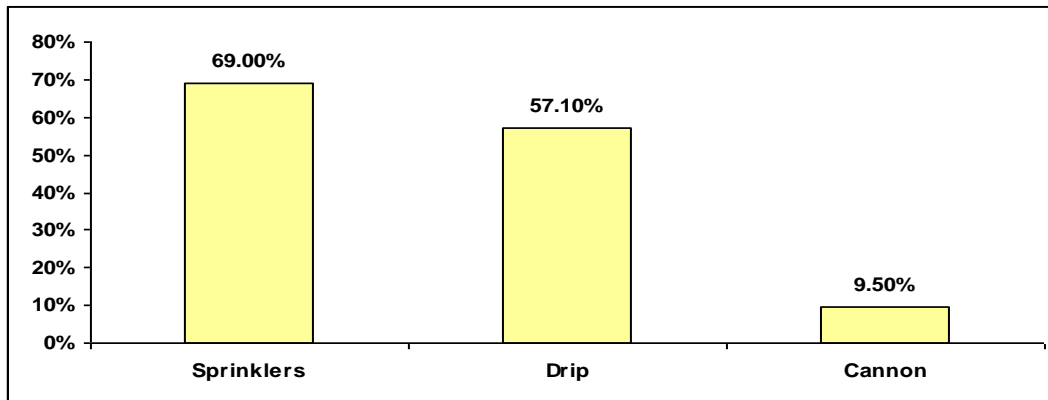
	<b>Percent</b>
<b>Once each 2 weeks</b>	<b>28.57%</b>
<b>Once each month</b>	<b>28.57%</b>
<b>1</b>	<b>19.05%</b>
<b>2</b>	<b>9.52%</b>
<b>3</b>	<b>4.76%</b>
<b>5</b>	<b>4.76%</b>
<b>7</b>	<b>4.76%</b>
<b>Total</b>	<b>100.00%</b>

**4- Crops farmers plant in each season**

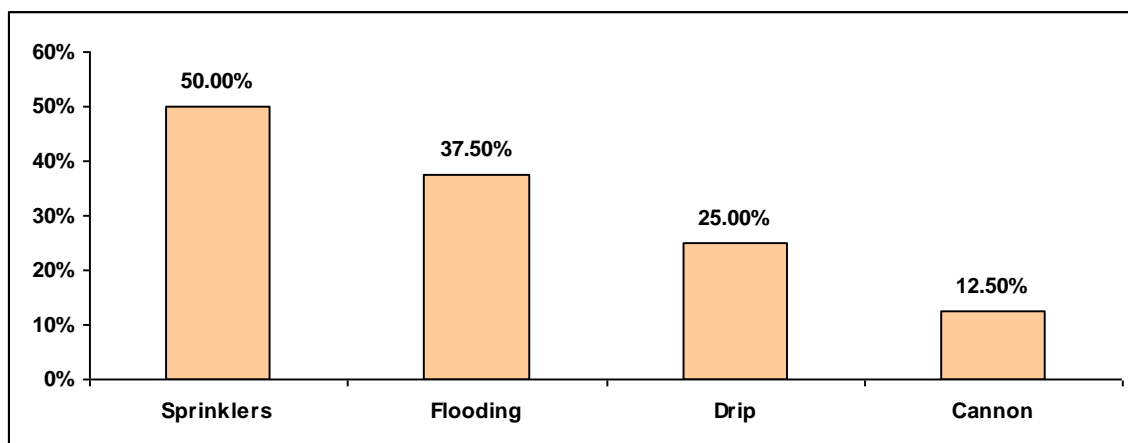
	% of total area	% of total area for subscribed famers	% of total area for non-subscribed famers	% of total area in Joub Jenine Kamed Loz	% of total area in Qaraoun, Balloul, Saghbine, Lala
Trees/orchards (apple/olive/fruits)	11.94%	12.96%	4.68%	0.00%	26.32%
Winter Wheat	73.46%	71.33%	78.07%	89.34%	49.29%
Potatoes in Summer	28.90%	30.97%	0.00%	47.86%	6.06%
Potatoes in Winter	7.51%	8.57%	0.00%	13.74%	0.00%
Vegetables in Summer	45.50%	43.68%	72.27%	44.42%	46.80%
Vegetables in Fall	11.29%	12.89%	12.32%	0.00%	24.89%

## 5- What type of irrigation do you use? (More than one answer)

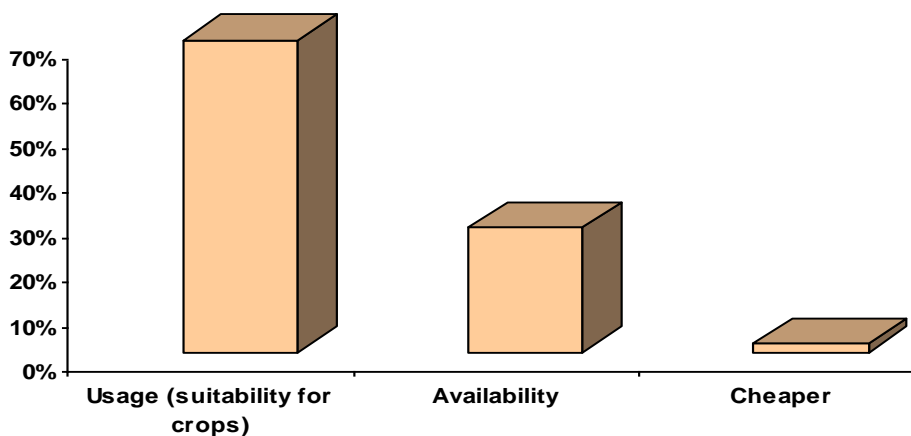
- Subscribers



- Non Subscribers



### 5.1- What information guides you in choosing your irrigation type?



**6- Pros and Cons for the following water sources:**

**Canal Water (Pros)**

**LRA (strong points)**

	Frequency	Percent
<b>More cost-effective</b>	<b>31</b>	<b>62.00%</b>
<b>Water is Always Available</b>	<b>8</b>	<b>16.00%</b>
<b>Vital Project</b>	<b>2</b>	<b>4.00%</b>
<b>Easier Extensions</b>	<b>2</b>	<b>4.00%</b>
<b>Didn't Try It</b>	<b>1</b>	<b>2.00%</b>
<b>No Answer</b>	<b>1</b>	<b>2.00%</b>
<b>Don't Exist</b>	<b>1</b>	<b>2.00%</b>
<b>The Abundance Of Water And Fuel Oil</b>	<b>1</b>	<b>2.00%</b>
<b>Have No Other Source</b>	<b>1</b>	<b>2.00%</b>
<b>The Regularity In Work</b>	<b>1</b>	<b>2.00%</b>
<b>Cost-Effective In Electricity</b>	<b>1</b>	<b>2.00%</b>
<b>Total</b>	<b>50</b>	<b>100.00%</b>

**Own wells (pros)**

	Frequency	Percent
<b>Water Is Always Available</b>	<b>23</b>	<b>46.00%</b>
<b>Freedom In Use</b>	<b>6</b>	<b>12.00%</b>
<b>Clean</b>	<b>5</b>	<b>10.00%</b>

<b>The Freedom In Water Deliverance</b>	<b>5</b>	<b>10.00%</b>
<b>Don't Know</b>	<b>2</b>	<b>4.00%</b>
<b>No Answer</b>	<b>2</b>	<b>4.00%</b>
<b>Its Necessary Presence whenever Needed</b>	<b>1</b>	<b>2.00%</b>
<b>Clean Provided Water</b>	<b>1</b>	<b>2.00%</b>
<b>Clean And Pressure Free</b>	<b>1</b>	<b>2.00%</b>
<b>Private Property Generator</b>	<b>1</b>	<b>2.00%</b>
<b>The Water Is On Its Expenses</b>	<b>1</b>	<b>2.00%</b>
<b>More In Control Than LRA</b>	<b>1</b>	<b>2.00%</b>
<b>Stronger Water Pressure</b>	<b>1</b>	<b>2.00%</b>
<b>Total</b>	<b>50</b>	<b>100.00%</b>

#### **Private Wells of others (Pros)**

	<b>Frequency</b>	<b>Percent</b>
<b>Availability of water</b>	<b>19</b>	<b>38.00%</b>
<b>No answer</b>	<b>14</b>	<b>28.00%</b>
<b>Clean</b>	<b>6</b>	<b>12.00%</b>
<b>Independence In Water Connection</b>	<b>3</b>	<b>6.00%</b>
<b>Freedom of use</b>	<b>2</b>	<b>4.00%</b>
<b>Don't know</b>	<b>1</b>	<b>2.00%</b>
<b>clean and free of pressure</b>	<b>1</b>	<b>2.00%</b>
<b>Water on its own expenses</b>	<b>1</b>	<b>2.00%</b>
<b>More in Control than LRA</b>	<b>1</b>	<b>2.00%</b>

<b>Healthy</b>	<b>1</b>	<b>2.00%</b>
<b>Stronger Water Pressure</b>	<b>1</b>	<b>2.00%</b>
<b>Total</b>	<b>50</b>	<b>100.00%</b>

#### Canal Water (Cons)

	<b>Frequency</b>	<b>Percent</b>
<b>Pollution</b>	<b>18</b>	<b>36.00%</b>
<b>Delay In Time</b>	<b>13</b>	<b>26.00%</b>
<b>Scarcity Of Water</b>	<b>5</b>	<b>10.00%</b>
<b>Inappropriate Water Distribution To Farmer</b>	<b>2</b>	<b>4.00%</b>
<b>Weakness of water</b>	<b>2</b>	<b>4.00%</b>
<b>Didn't try it</b>	<b>1</b>	<b>2.00%</b>
<b>No answer</b>	<b>1</b>	<b>2.00%</b>
<b>Don't exist</b>	<b>1</b>	<b>2.00%</b>
<b>The influential authority</b>	<b>1</b>	<b>2.00%</b>
<b>Expensive prices</b>	<b>1</b>	<b>2.00%</b>
<b>The delay in canals mobilization</b>	<b>1</b>	<b>2.00%</b>
<b>unavailability of water</b>	<b>1</b>	<b>2.00%</b>
<b>Irresponsibility for any emergency</b>	<b>1</b>	<b>2.00%</b>
<b>lack of cooperation</b>	<b>1</b>	<b>2.00%</b>
<b>Getting Insufficient Quantity of water from network</b>	<b>1</b>	<b>2.00%</b>
<b>Total</b>	<b>50</b>	<b>100.00%</b>

### Own wells (Cons)

	Frequency	Percent
<b>Cost of Fuels</b>	<b>33</b>	<b>66.00%</b>
<b>High Costs</b>	<b>11</b>	<b>22.00%</b>
<b>Cost of electricity</b>	<b>2</b>	<b>4.00%</b>
<b>Don't know</b>	<b>1</b>	<b>2.00%</b>
<b>No answer</b>	<b>1</b>	<b>2.00%</b>
<b>Fuel Oil And Defects And Maintenance</b>	<b>1</b>	<b>2.00%</b>
<b>The Difficulty To Get A New Permission To Dig A Well</b>	<b>1</b>	<b>2.00%</b>
<b>Total</b>	<b>50</b>	<b>100.00%</b>

### - Private wells of others (Pros)

	Frequency	Percent
<b>Cost of Fuels</b>	<b>23</b>	<b>46.00%</b>
<b>No answer</b>	<b>14</b>	<b>28.00%</b>
<b>Expensive Cost</b>	<b>11</b>	<b>22.00%</b>
<b>Don't know</b>	<b>1</b>	<b>2.00%</b>
<b>Fuel oil and Defects and Maintenance</b>	<b>1</b>	<b>2.00%</b>
<b>Total</b>	<b>50</b>	<b>100.00%</b>

**7- Please name the top two water-related problems you are facing today.**

	Frequency	Percent
<b>Pollution</b>	<b>28</b>	<b>56.00%</b>

<b>Water Insufficiency</b>	<b>9</b>	<b>18.00%</b>
<b>No answer</b>	<b>7</b>	<b>14.00%</b>
<b>Water Scarcity in Summer</b>	<b>7</b>	<b>14.00%</b>
<b>non-intensive water</b>	<b>3</b>	<b>6.00%</b>
<b>Fuel oil</b>	<b>2</b>	<b>4.00%</b>
<b>Irregular delivery of water</b>	<b>2</b>	<b>4.00%</b>
<b>There are no problems</b>	<b>1</b>	<b>2.00%</b>
<b>the sediments</b>	<b>1</b>	<b>2.00%</b>
<b>the weather</b>	<b>1</b>	<b>2.00%</b>
<b>high cost</b>	<b>1</b>	<b>2.00%</b>
<b>some defects in the network</b>	<b>1</b>	<b>2.00%</b>
<b>low maintenance</b>	<b>1</b>	<b>2.00%</b>
<b>bad administration</b>	<b>1</b>	<b>2.00%</b>
<b>unorganized delivery dates and water cut</b>	<b>1</b>	<b>2.00%</b>
<b>Base</b>	<b>50</b>	

**8- On a scale of 1-5 where 5 is Extremely satisfied, 4 is Somewhat Satisfied, 3 is Neutral, 2 is Somewhat Dissatisfied, 1 is Extremely Dissatisfied, how do you feel about the following: (LRA subscribers)**

	<b>Extremely satisfied</b>	<b>Somewhat Satisfied</b>	<b>Neutral</b>	<b>Somewhat Dissatisfied</b>	<b>Extremely Dissatisfied</b>
<b>Quality of LRA Irrigation Water</b>	<b>2.38%</b>	<b>14.29%</b>	<b>38.10%</b>	<b>16.67%</b>	<b>28.57%</b>
<b>Quantity of LRA Irrigation Water</b>	<b>21.43%</b>	<b>11.90%</b>	<b>14.29%</b>	<b>19.05%</b>	<b>33.33%</b>
<b>Timing of LRA Irrigation Water</b>	<b>14.29%</b>	<b>19.05%</b>	<b>7.14%</b>	<b>19.05%</b>	<b>40.48%</b>
<b>Overall LRA services</b>	<b>16.67%</b>	<b>28.57%</b>	<b>33.33%</b>	<b>4.76%</b>	<b>16.67%</b>



- 9- On a scale of 1-5 where 5 is Extremely satisfied, 4 is Somewhat Satisfied, 3 is Neutral, 2 is Somewhat Dissatisfied, 1 is Extremely Dissatisfied, how do you feel about the following: (Private well owners/subscribers)

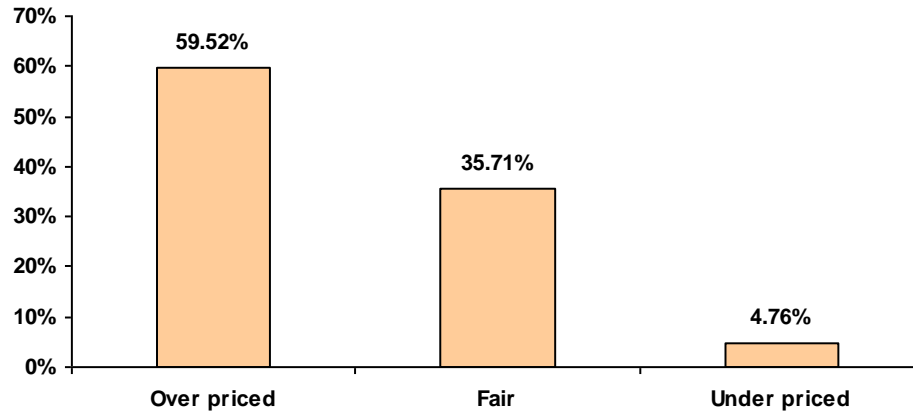
	Extremely satisfied	Somewhat Satisfied	Neutral	Somewhat Dissatisfied	Extremely Dissatisfied	No answer
Quality of Irrigation Water	62.50%	12.50%	0.00%	0.00%	0.00%	25.00%
Quantity of Irrigation Water	37.50%	12.50%	25.00%	0.00%	0.00%	25.00%
Timing of Irrigation Water	75.00%	0.00%	0.00%	0.00%	0.00%	25.00%
Overall services	75.00%	0.00%	0.00%	0.00%	0.00%	25.00%

- 10- On a scale of 1-5 where 5 is Extremely satisfied, 4 is Somewhat Satisfied, 3 is Neutral, 2 is Somewhat Dissatisfied, 1 is Extremely Dissatisfied, how do you feel about the following: (Private well owners/subscribers)

- 11- Which of the following statements do you agree with the most?

	Percent
Water-related problems should be treated by the LRA	59.52%
Water-related problems can be treated through better cooperation between the farmers and LRA	38.10%
Water-related problems are the responsibility of the farmers	2.38%
Total	100.00%

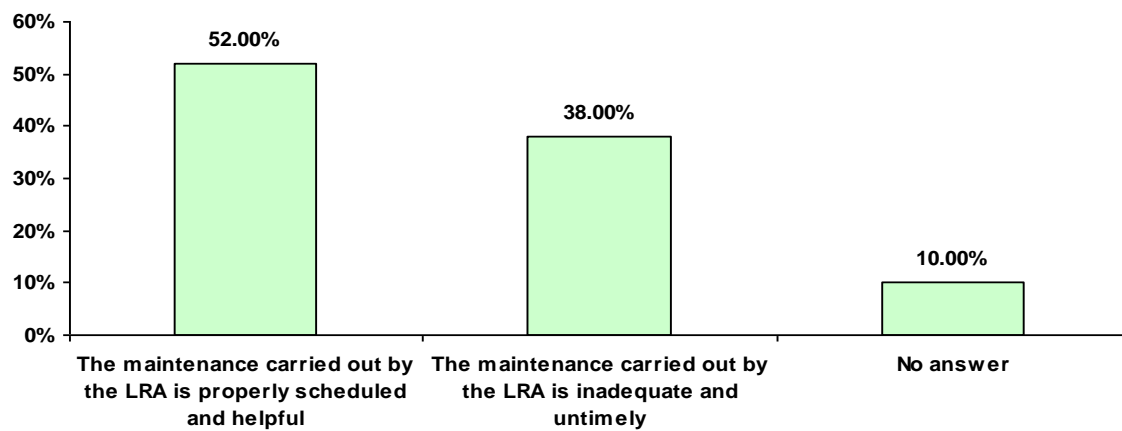
### 12- How would you describe the fees you pay LRA?



### 13- How often do you:

	Always (Daily)	Often (Once a week)	Sometimes (Once a month)	Rarely (Once a year)	Never
Receive Advice from LRA	4.76%	7.14%	19.05%	7.14%	61.90%
Receive explanations for sudden water shortage	9.52%	7.14%	23.81%	9.52%	50.00%
Get informed about maintenance works	23.81%	7.14%	11.90%	2.38%	54.76%
Hold meetings with farmers to discuss issues	23.81%	16.67%	19.05%	16.67%	23.81%
Compromise and make sacrifices for the sake of the general community	9.52%	11.90%	16.67%	11.90%	50.00%

### 14- Which of the following statements best describes your point of view?



**15- Which of the following statements best describes your point of view?**

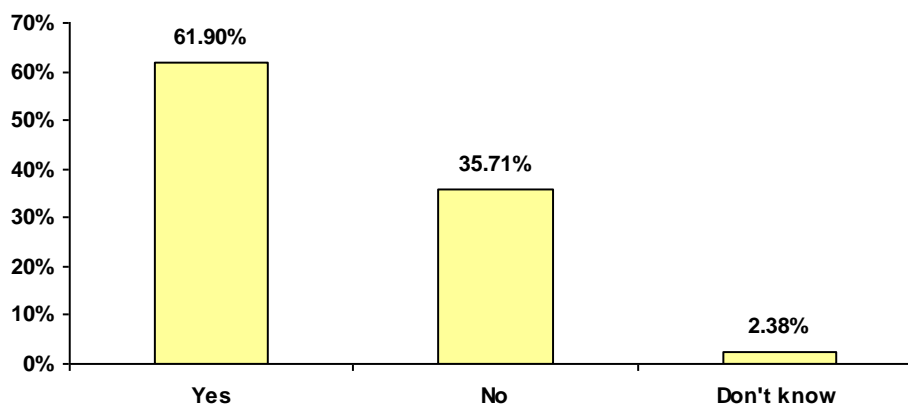
	Percent
The water network could be stronger but is effective	50.00%
The water network is strong and stable	35.71%
The water network is frail and cannot withstand pressure	14.29%
Total	100.00%

**16- Two non water-related problems that in your opinion the LRA should handle**

	Percent
No Answer	21.43%
Don't Exist	11.90%
Weakness In Agricultural Guidance	9.52%
Reduction In Prices	7.14%
Delay	4.76%
Delay In Maintenance	4.76%
Dishonesty	4.76%
Mismanagement	4.76%
Shortage In Maintenance	4.76%
Unorganized Distribution	2.38%
Hiring Under Influence	2.38%
The Agricultural Roads	2.38%
The Relation Between The Employees And The Farmers	2.38%
The High Cost Of Water Embodiment	2.38%
The Chaos And Lack Of Guidance	2.38%
The Date Of Water Delivery Date Must Be Advanced	2.38%
Delay In Cutting Water	2.38%
Analyzing the Soil	2.38%

Let Us Invest In Existing Lands Surrounding The Lake	2.38%
Closing The Filters	2.38%
Hiring Lands Which Were Taken By The Farmers For LRA Sake	2.38%
Offering Pesticides	2.38%
Cleaning The Canals	2.38%
Mismanagement Of Some Employees	2.38%
Weakness In Irrigation Guidance	2.38%
Lack Of Cooperation With The Farmers	2.38%
Lack Of Experience	2.38%
Lack Of Experience And Guidance	2.38%
Lack For Organized Water Delivery And Cut	2.38%
LRA Is Not Being Responsible For Any Damage Occurring To Agriculture	2.38%
Soil Examination	2.38%
Not Fully Performing All Their Duties	2.38%
Helping Farmers And Knowing Their Problems	2.38%

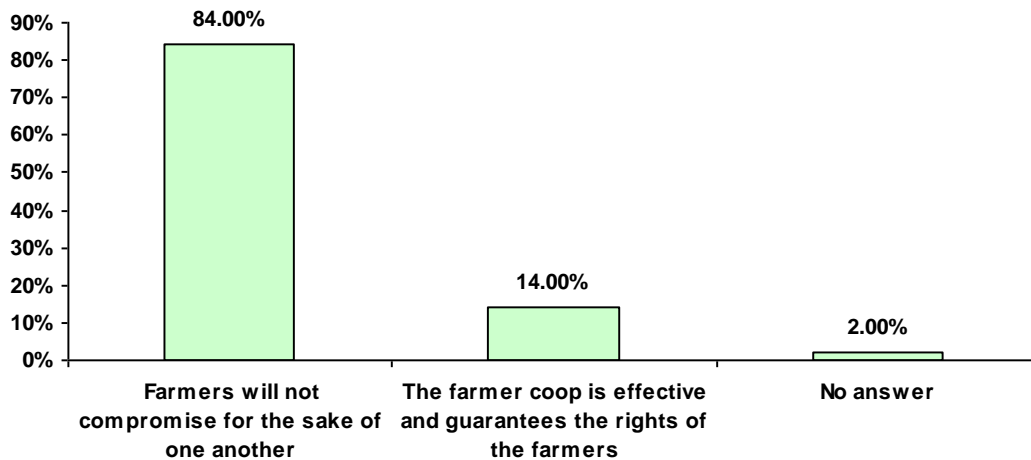
**17- If the LRA was willing to give irrigation water out of the regular times when rainfall is scarce, would you be willing to pay an extra amount of money for it?**



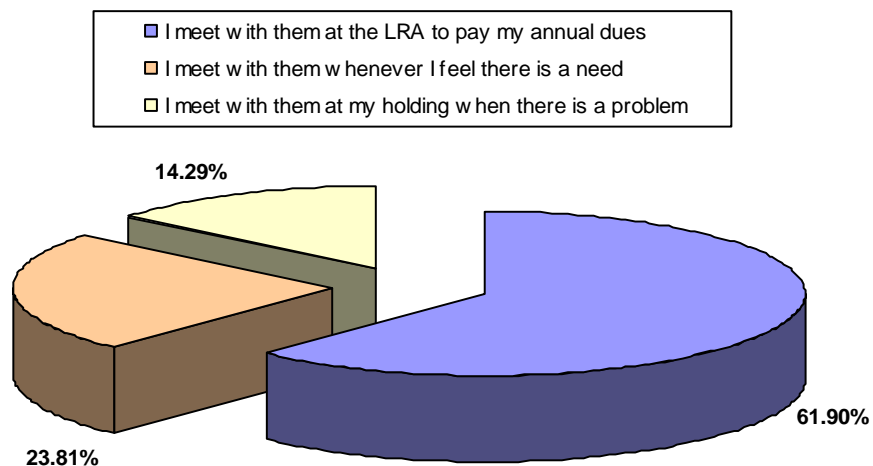
**18- With respect to the set-up of the way water is distributed over the holding, which of the following statements do you agree with the most?**

	Percent
I have enough experience to decide how the water should be distributed over my holding	54.00%
I wouldn't mind receiving professional advice from LRA on how to set up the water distribution system on my holding	42.00%
No answer	4.00%
TOTAL	100%

**19- Which of the following statements do you agree with the most?**



**20- When do you usually meet with LRA officials?**

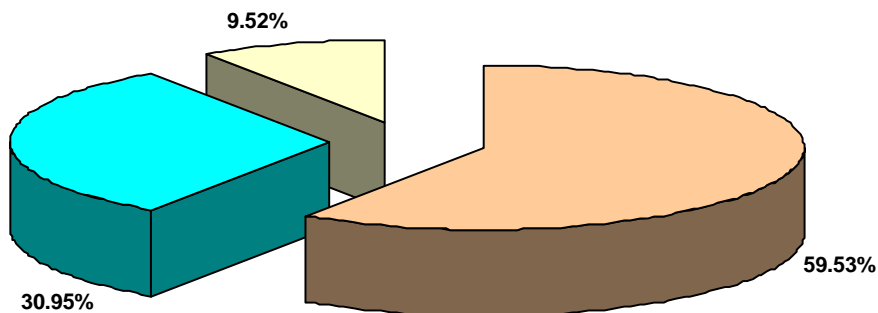


**21- How active are each of the following?**

	<b>Extremely Active</b>	<b>Somewhat Active</b>	<b>Somewhat Inactive</b>	<b>Extremely Inactive</b>
<b>Farmer Coop</b>	<b>0.00%</b>	<b>14.00%</b>	<b>2.00%</b>	<b>84.00%</b>
<b>Government Agricultural Extension Centers</b>	<b>0.00%</b>	<b>22.00%</b>	<b>8.00%</b>	<b>70.00%</b>
<b>Local / International Organizations</b>	<b>2.00%</b>	<b>12.00%</b>	<b>4.00%</b>	<b>82.00%</b>

**22- With respect to the problem of water pollution, which of the following statements do you agree with the most?**

<input type="checkbox"/> The LRA should be more active in controlling and solving the problem
<input type="checkbox"/> The LRA is not dealing with the problem of pollution whatsoever
<input type="checkbox"/> The LRA is actively involved in limiting and controlling this problem



**23- For each activity in the following list, please tell who is performing it at present it and who you think should be handling it:**

- Subscribers

<b>Activity</b>		<b>LRA</b>	<b>Ministry of Agriculture &amp; Extensions</b>	<b>Farmers</b>	<b>Ag. Assistants at shops</b>	<b>Farmer Associations</b>
<b>Extension Services (Advice on seeds, fertilizers, pesticides, cropping patterns)</b>	<b>Who handles this now?</b>	<b>2.38%</b>	<b>7.14%</b>	<b>69.05%</b>	<b>9.52%</b>	<b>0.00%</b>
	<b>Who should</b>	<b>0.00%</b>	<b>97.62%</b>	<b>2.38%</b>	<b>0.00%</b>	<b>0.00%</b>

	handle it?					
Water distribution at system level (canal 900 and Pump stations)	Who handles this now?	100.00%	0.00%	0.00%	0.00%	0.00%
	Who should handle it?	73.81%	14.29%	11.90%	0.00%	0.00%
Water distribution at plot level (rotation among farmers)	Who handles this now?	100.00%	0.00%	0.00%	0.00%	0.00%
	Who should handle it?	76.19%	11.90%	11.90%	0.00%	0.00%

- Non Subscribers

Activity		LRA	Ministry of Agriculture & Extensions	Farmers	Ag. Assistants at shops	Farmer Associations
Extension Services (Advice on seeds, fertilizers, pesticides, cropping patterns)	Who handles this now?	0.00%	12.50%	75.00%	12.50%	0.00%
	Who should handle it?	12.50%	87.50%	0.00%	0.00%	0.00%
Water distribution at system level (canal 900 and Pump stations)	Who handles this now?	87.50%	0.00%	12.50%	0.00%	0.00%
	Who should handle it?	87.50%	12.50%	0.00%	0.00%	0.00%
Water distribution at plot level (rotation among farmers)	Who handles this now?	87.50%	0.00%	12.50%	0.00%	0.00%
	Who should handle it?	87.50%	12.50%	0.00%	0.00%	0.00%

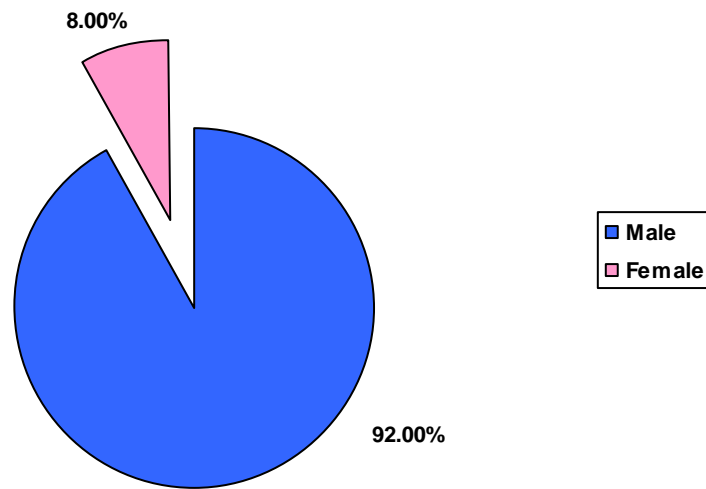
**24- On a scale of 1-5 where 5 is Extremely Necessary, 4 is Somewhat Necessary, 3 is In between, 2 is Somewhat unnecessary, 1 is Extremely unnecessary, please rate the need for the following:**

	<b>Extremely Necessary</b>	<b>Somewhat Necessary</b>	<b>In Between</b>	<b>Somewhat Unnecessary</b>	<b>Extremely Unnecessary</b>
<b>Regular Testing of seeds in Professional Labs</b>	<b>100.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>
<b>Regular testing of the water in Professional Labs</b>	<b>100.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>
<b>Regular testing of the soil in Professional Labs</b>	<b>100.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>
<b>Testing produce for quality and residues</b>	<b>100.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>
<b>Setting up a model parcel under LRA control where specialized experts would work and show farmers effective irrigation practices, fertilizer application, and various agricultural practices.</b>	<b>98.00%</b>	<b>2.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>



## Personal information

### Gender



### Age

Mean	48.12
Mode	50.00
Std. Deviation	10.81
Minimum	20.00
Maximum	70.00

### Area of residence

